

carbonised. As to the jet of water, Prof. Weber rejects the hypothesis of a sudden generation of vapour forcing up water from the street. Another explanation offered is that the lightning, passing through the window to the street, generated a vortex of air about itself with vacuum in the interior, through which the water was driven as through a tube. A third hypothesis remains, viz. that a conical *trombe* struck the street, was reflected, and passed through the window in the form of a jet of water. In this case the lightning would merely have accompanied or preceded the *trombe*. Prof. Weber seeks further light on such phenomena.

ON the evening of January 9 a very fine display of the aurora borealis was seen in the southern parts of Norway.

A MAGNIFICENT meteor was seen by the station-master at Leangen Station, in the north of Norway, on January 16, at 8.15 a.m., it being still dark. He states that the meteor first looked like a small star, but, approaching with great velocity, soon attained the size of a cheese-plate. It had a dazzling white light, very like the electric, and was clearly visible, being below the clouds in the upper part of the sky. When it had passed the zenith and reached the eastern horizon, it separated into several parts, which gradually became extinguished. It left a trail for a few seconds, brownish-yellow in colour. Another meteor, to which we referred last week as having been seen at Aas, near Christiania, at 5.30 p.m. on January 5, was also seen in various other parts of the province of Smaalenene, even as far south as Frederikshald, near the Swedish frontier (distance from Aas about 100 kilometres = 63 miles). It appeared there in the constellation Taurus, at 5.15 p.m., and moved in a north-westerly direction. It left a long bright trail, and its passage was, according to some, accompanied by a faint hissing.

ON New Year's Eve an earthquake was felt in the central parts of Norway, particularly at Elverum and Løiten, where the houses shook. Another shock was felt in the province of Christiansand, at about 4 a.m. on January 16, followed by vivid flashes of lightning. In several houses the doors sprang open, and furniture, &c., was moved. A girl was thrown out of bed in one place. The barometer was very low at the time, but remained the same as on the previous day.

PROF. LOMMEL has recently described (*Wied. Ann.* 1) an aerostatic balance for determining the specific gravity of gases. It is useful for lecture experiments. Under one scale of a balance is hung, by means of a wire, a closed glass balloon, which is inclosed in a glass vessel having in its cover a small hole for the wire. This vessel has a side tube, with stopcock, near the bottom. The instrument being balanced while air is in the vessel, another gas is allowed to stream in and displace the air, whereupon the balloon rises or sinks according as the gas is heavier or lighter than air. By adding weights in one scale or the other equilibrium is restored, and one finds how much more or less a volume of gas equal to that of the balloon weighs than the same volume of air at the same temperature and pressure.

WE have received the Calendars of the University College of Aberystwith and Cardiff for the Session 1885-86, and the reports of work in both cases are very satisfactory, showing, as they do, a considerable increase in the number of students, and in the general scope of the educational work. We have examined with especial interest the Aberystwith Calendar, for it will be remembered that during last summer the College there was almost wholly destroyed by fire. The Council met the situation by taking a large hotel, where the work of the institution is carried on apparently without any serious inconvenience. The Principal of this College calls attention to a question which requires the careful consideration of the responsi-

ble authorities of the three University Colleges of Wales, and which, for the sake of the equitable distribution of the prizes and scholarships of these institutions, it is to be hoped may speedily be settled. Principal Edwards points out the danger that healthy and legitimate rivalry between the Colleges is in danger of degenerating into a bid for students by the offer of money bribes, and he quotes the case of a student who wandered from one to the other, taking scholarships at all three by recommencing his course at each in succession. There is apparently no regulation preventing a graduate of one beginning as an undergraduate at each of the others, and carrying off the prizes to the disadvantage of *bonâ-fide* students. Unfortunately, the negotiations which have been undertaken to prevent this grave abuse have hitherto proved unsuccessful, but it behoves the authorities concerned to prevent this misapplication of money so nobly subscribed for education by all classes of the Welsh people. Two very interesting and suggestive tables will be found at page 25 of the Aberystwith Calendar. The first gives the ages of the students: 76 are over 20 years of age, 22 over 25, and 5 over 30. The second contains the occupations of the parents, and shows in the most marked way the struggles which, to their infinite credit, Welsh parents make to educate their children. This trait in the Welsh character is well known, but we have not seen it exhibited in this definite, concrete manner before.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus* ♀) from India, presented by Miss Douglas; a Chacma Baboon (*Cynocephalus porcellus* ♀) from South Africa, presented by Mr. F. Radcliffe; a Ring-tailed Coati (*Nasua rufa* ♀) from South America, presented by Miss A. Pagella; an Orange-winged Amazon (*Chrysotis amazonica*) from South America, presented by Mr. G. F. Richards; two Feline Douracoulis (*Nyctipithecus vociferans*), two Silky Marmosets (*Midas rosalia*), a Razor-billed Curassow (*Mitua tuberosa*), a Mantled Buzzard (*Leucopternis palliata*) from Brazil, a Raccoon (*Procyon lotor*) from North America, purchased; a Collared Fruit Bat (*Cynonycteris collaris*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE NEW STAR IN THE GREAT NEBULA IN ANDROMEDA.—As the *Nova* in Andromeda was the first object of its kind to which accurate photometric methods of observation were applied, Prof. Seeliger of Munich has taken the opportunity of investigating whether the observed variations of brightness throw any light on the physical history of the phenomenon. If we suppose that the surface-temperature of a "new" star is suddenly increased by an enormous quantity, and, in consequence, the brightness increased to a corresponding extent, and assume that the latter is proportional to an arbitrary power, n , of the temperature, then the light curve constructed from the observations will be a curve which represents the n th power of the successive temperatures of a cooling body. Prof. Seeliger has deduced an expression for the temperature of a sphere at any time, t , on the assumption that the sphere is homogeneous with respect to the conduction of heat, that at the time $t = 0$ it has the same temperature throughout its interior, and that the temperature of the surrounding medium is zero. If, then, θ be the brightness corresponding to a temperature θ , we have

$\theta = h^{\frac{t}{n}}$, and using Pogson's scale for transforming brightness into stellar magnitude, there results a formula for the magnitude of the cooling star at any time. For the purpose of comparing his formula with Herr Müller's photometric observations of the *Nova*, extending from 1885 September 2 to October 13, Prof. Seeliger assumes that $n = 1$, and that the epoch for which $t = 0$ is 1885 August 27d. 8h. Berlin M.T. He also uses quite approximate values for the constants involved in his formula, the more accurate determination of which would be a work of difficulty. Under these circumstances he gets a very fair agreement between the observed and computed values, which would,

he considers, be improved by using more accurate values of the constants, and of the epoch for which $t = 0$. The magnitude corresponding to this latter epoch is 7.73. Considering that there is evidence to show that the Andromeda nebula is, in part at least, a star-cluster consisting of a vast number of faint stars, Prof. Seeliger thinks it not improbable that the blazing forth of the *Nova* may have been due to a collision which caused an enormous development of heat and light. At all events, the fact that his formula represents the observations tolerably well appears to him to be sufficient evidence to show that the supposed conditions are not, in the main, at variance with the actual circumstances of the case.

PRESENT STATE OF THE SOLAR ACTIVITY.—The sunspot maximum, after some remarkable oscillations, was definitely attained about the close of 1883, the interval from the period of minimum having been nearly two years longer than usual. Since that date there has been a steady diminution in both the numbers and areas of the sunspots. M. R. Wolf gives (*Comptes rendus*, vol. c. No. 3, and vol. cii. No. 3) the following values for his relative numbers for the last three years: 1883, 63.7; 1884, 63.3; 1885, 50.3. The diminution in the last part of 1885 was particularly marked, there having been a vigorous rally in the months of May, June, and July, followed by a rapid decline. The relative numbers for the last three months of the year fell far below the mean of the twelvemonth. The figures given by M. Tacchini closely correspond to those given by M. Wolf, as the following table will show. The last three columns give Tacchini's numbers:—

1885	Wolf's numbers	Relative frequency	Relative size	Daily number of groups
January ...	31.4 ...	19.57 ...	43.19 ...	4.33
February ...	67.2 ...	23.81 ...	77.33 ...	5.96
March ...	46.6 ...	16.23 ...	44.92 ...	2.92
April ...	54.6 ...	15.10 ...	56.86 ...	3.48
May ...	80.5 ...	18.68 ...	86.21 ...	5.80
June ...	82.1 ...	22.36 ...	132.76 ...	5.21
July ...	61.4 ...	15.41 ...	90.22 ...	4.45
August ...	47.7 ...	11.20 ...	44.70 ...	3.40
September ...	43.4 ...	9.14 ...	59.20 ...	3.31
October ...	42.6 ...	12.55 ...	55.64 ...	3.09
November ...	26.8 ...	6.35 ...	22.90 ...	2.30
December ...	18.9 ...	4.84 ...	21.44 ...	2.12

Faculae have not shown so rapid a decline, but there has been a distinct falling off in these also; the difference, however, is at present noticed rather in a loss of brilliancy than of apparent area. But hitherto the prominences have shown but slight indications of a participation in the falling off so strongly exhibited by the spots. The following numbers, derived from papers by the Rev. S. J. Perry in the *Observatory* for February 1885 and 1886, show indeed a slight increase of energy for 1885 over 1884:—

Year	Mean height of chromosphere, excluding prominences	Mean height of prominences	Mean extent of prominence arc
1880 ...	7.93 ...	23.46 ...	23.21
1881 ...	8.04 ...	24.61 ...	33.18
1882 ...	8.24 ...	24.55 ...	40.57
1883 ...	8.27 ...	27.23 ...	41.24
1884 ...	7.94 ...	25.74 ...	29.6
1885 ...	8.00 ...	28.67 ...	28.25

Mean }
1880-1885 } ... 8.07 ... 25.71 ... 32.45

The mean extent of prominence arc is thus the only element which seems to point to the maximum being past.

But if the prominences do not show any close correspondence to the behaviour of the spots, M. Wolf finds that the variations of magnetic declination have responded to their changes fairly closely. In the paper alluded to above he gives, side by side with his "relative" spot numbers, the monthly means of the variations in magnetic declination as observed at Milan. The mean observed value for 1885 is 7.95, whilst 7.88 is the mean value computed from the formula M. Wolf had deduced in former years for Milan, $v = 5.62 + 0.045 r$, where r is the relative sunspot number for the year.

Prof. Spörer points out (*Comptes rendus*, vol. ci. No. 26) that the spots have not been equally distributed between the two

hemispheres during the period of maximum, but that throughout the years 1883, 1884, and 1885 there has been a nearly constant predominance of southern spots over northern; whereas in the period from minimum to the end of 1882 the predominance rested, on the whole, with the northern hemisphere. This alteration has also been accompanied by somewhat of a check in the regularity of the progress of the spots towards the equator, which is usually so marked in the interval from one minimum to the next.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1886 FEBRUARY 28—MARCH 6

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on February 28

Sun rises, 6h. 49m.; souths, 12h. 12m. 41'.5s.; sets, 17h. 36m.; decl. on meridian, 7° 52' S.; Sidereal Time at Sunset, 4h. 10m.

Moon (New on March 5) rises, 3h. 39m.; souths, 8h. 6m.; sets, 12h. 34m.; decl. on meridian, 18° 16' S.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian
Mercury ...	7 5 ...	12 28 ...	17 51 ...	7 59 S.
Venus ...	5 28 ...	11 4 ...	16 40 ...	5 19 S.
Mars ...	18 7* ...	0 53 ...	7 39 ...	8 23 N.
Jupiter ...	19 41* ...	1 45 ...	7 49 ...	0 4 S.
Saturn ...	11 21 ...	19 32 ...	3 43* ...	22 45 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

March	h.	
3 ...	5 ...	Saturn stationary.
5	Annular eclipse of the Sun; not visible in Europe.
6 ...	12 ...	Mars in opposition to the Sun.
6 ...	18 ...	Mercury in conjunction with and 0° 8' north of the Moon.

Variable Stars

Star	R.A. h. m.	Decl. °		h. m.
U Cephei ...	0 52.2 ...	81 16 N. ...	Mar. 3,	20 57 m
Algol ...	3 0.8 ...	40 31 N. ...	Feb. 28,	23 24 m
			Mar. 3,	20 13 m
λ Tauri ...	3 54.4 ...	12 10 N. ...	"	2, 18 12 m
ρ Lyrae ...	6 51.9 ...	55 29 N. ...	"	2, M
ζ Geminorum ...	6 57.4 ...	20 44 N. ...	"	4, 21 30 M
ν Geminorum ...	7 16.8 ...	13 19 N. ...	"	6, M
δ Libræ ...	14 54.9 ...	8 4 S. ...	"	4, 22 36 m
U Coronæ ...	15 13.6 ...	32 4 N. ...	"	5, 20 13 m
V Coronæ ...	15 45.5 ...	39 55 N. ...	"	5, m
U Ophiuchi ...	17 10.8 ...	1 20 N. ...	"	3, 5 28 m
			and at intervals of	20 8
X Sagittarii ...	17 40.4 ...	27 47 S. ...	Mar. 3,	0 0 m
			"	5, 21 30 M
W Sagittarii ...	17 57.8 ...	29 35 S. ...	"	6, 21 30 M
β Lyrae ...	18 45.9 ...	33 14 N. ...	"	6, 0 0 m
δ Cephei ...	22 24.9 ...	57 50 N. ...	"	3, 0 0 M
R Aquarii ...	23 37.9 ...	15 55 S. ...	"	3, M

M signifies maximum; m minimum; m₂ secondary minimum.

Meteor Showers

The first week in March furnishes the most favourable nights of the month for meteor observation, but none of the great periodical showers occur at this time. Amongst the radiant represented are the following:—

Near γ Orionis, R.A. 80°, Decl. 6° N.; near α Persei, R.A. 50°, Decl. 48° N.; near η Bootis, R.A. 205°, Decl. 17° N.; near ξ Sagittarii, R.A. 280°, Decl. 17° S.; Ursa Major, R.A. 180°, Decl. 60° N.

BIOLOGICAL NOTES

CONTINUITY OF PROTOPLASM.—M. L. Olivier proposes, in the *Comptes rendus*, the following methods for determining the connection between the protoplasmic contents of adjacent cells:—(1) Photography. This distinctly reveals the perforation by canals of the cell-walls, when photographed direct with a magnifying power of 300-700 diams. (2) Direct observation, with